4.2 Radar

Hourly averaged wind profile data were acquired by the radar wind profiler in two different sampling modes. The first sampling mode (mode 1) acquired "high-resolution / low-range" wind profiles over 38 discrete range gates from 124 to 2158 m above the ground with a resolution of about 55 m. The second sampling mode (mode 2) acquired "low-resolution / high-range" wind profiles over 38 discrete range gates from 172 to 3732 m above the ground with a resolution of about 96 m.

In general, at least 50% or better data capture is attained by the radar in mode 1 from near the surface up to about 1500 m (Figure 61). More data is obtained between midnight (0700 UTC / 0000 PDT) and mid-morning (1700 UTC / 1000 PDT) with a sharp decrease in data capture during the late morning and afternoon hours between 1800 and 0100 UTC (1100 to 1800 PDT). The data availability for the sampling mode 2 is not quite as sensitive to diurnal changes of the atmosphere (Figure 62). At least 50% or better data capture is found up to about 2500 m in this sampling mode.

Contour plots of the scalar wind speed are shown in Figures 63 and 64. In general, the wind speed increases with height from 3 m s^{-1} at the lowest reported range gates (~ 100 to 200 m) up to 7 to 8 m s^{-1} above 2300 m. Above 1500 m, the winds tend to be the same magnitude over the course over the entire day. However, the radar data suggests that the winds decrease in magnitude below 1500 m between midnight (0700 UTC / 0000 PDT) and noon (1900 UTC / 1200 PDT).

The time / height vector plots (Figures 65 and 66) show similar behavior to that of the sodar data. Winds are extremely light (~ 1 m s^{-1}) in the late evening to early morning hours between 0600 and 1000 UTC (2300 to 0300 PDT) from the surface up to 200 m. Above 200 m, the winds are from the northeast and veer to the south with height. The southeasterly begins to establish itself down to the surface prior to sunrise and remains until mid-morning to about 1700 UTC (1000 PDT). For about three hours until 2000 UTC (1300 PDT), the wind flow from the surface to about 500 m becomes very light with values of U dropping to less than 1 m s^{-1}. The southerly flow remains above 500 m. The winds from the surface up to 1200 m reverse direction and come from the northwest from early afternoon (2000 UTC / 1300 PDT) into the evening (0700 UTC / 0000 PDT). It should be noted that the sodar and radar data do not exactly agree for this two-month climatological average. One reason may that fewer data points are used to compute the vector average wind at the higher sodar range gates. Conversely, those same sodar range gates would correspond to the lower radar range gates which have more data available to compute an average. Thus, biases may be introduced due to the lack of available data.

Finally, contour plots of the persistence are shown in Figures 67 and 68. The most persistent winds are the southerly winds observed above 2000 m and the easterly to southeasterly winds seen between midnight and late morning in the first several hundred meters of the atmosphere.

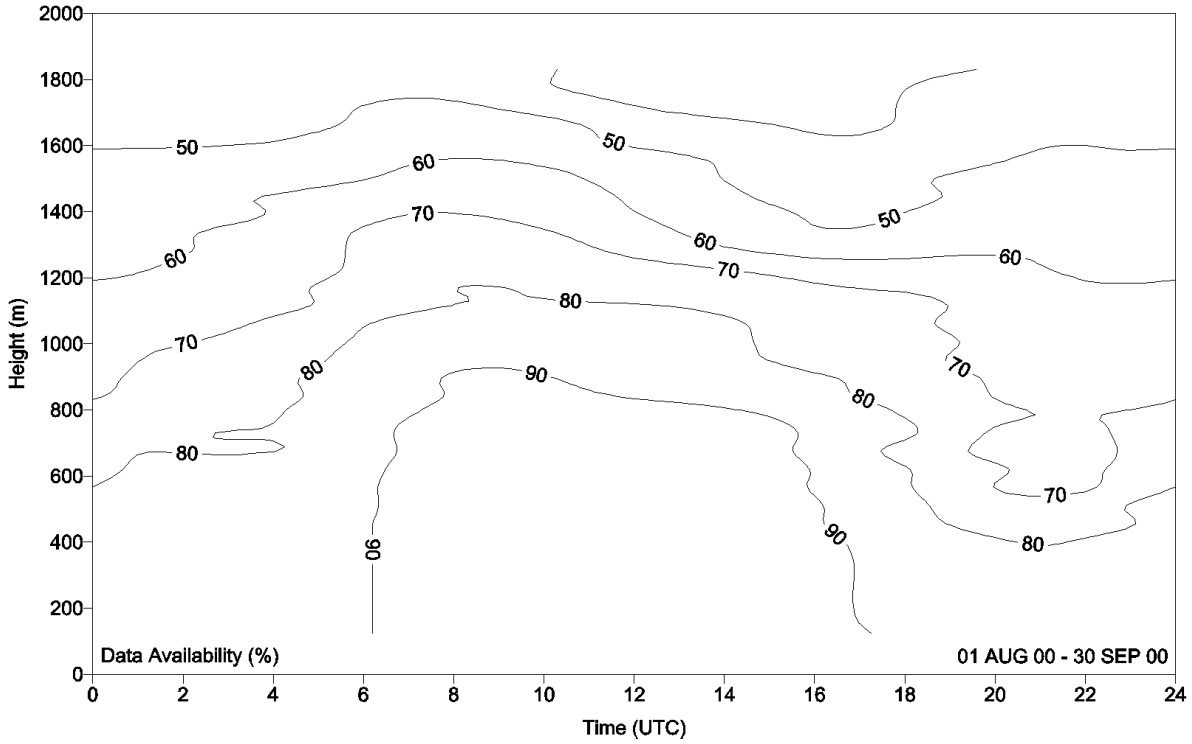

Figure 61. Radar (mode 1) data availability as a function of time and height.

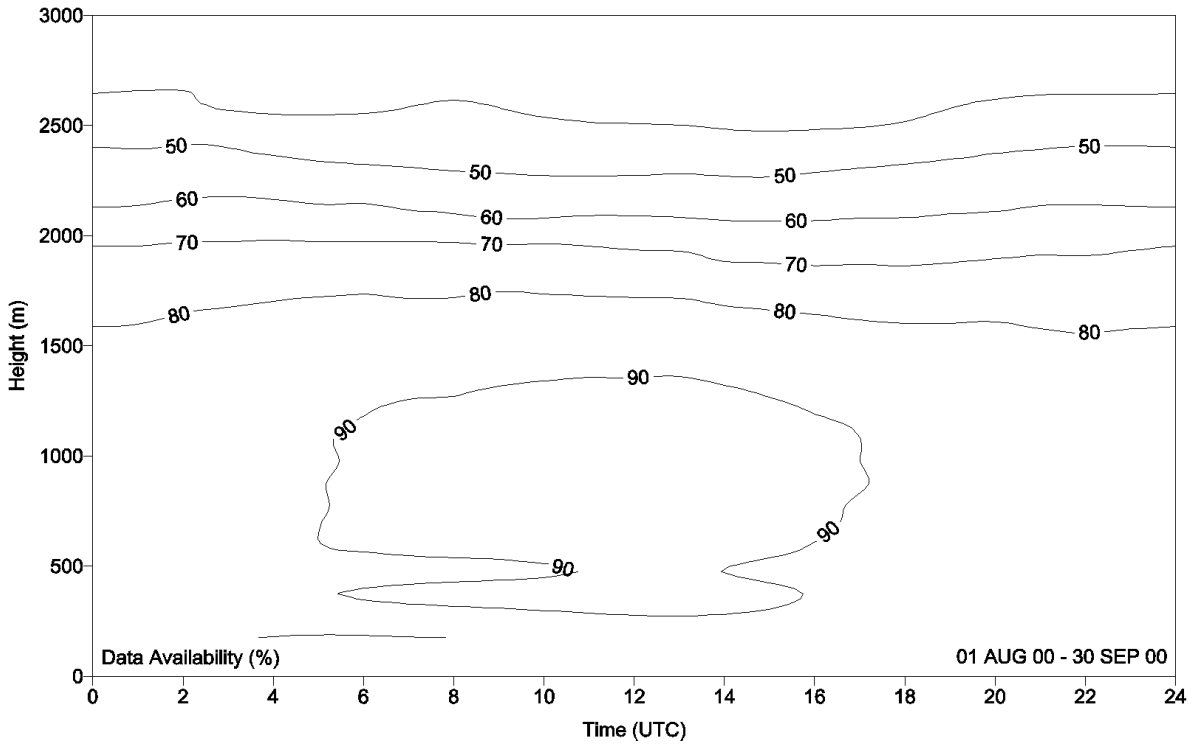

Figure 62. Radar (mode 2) data availability as a function of time and height.

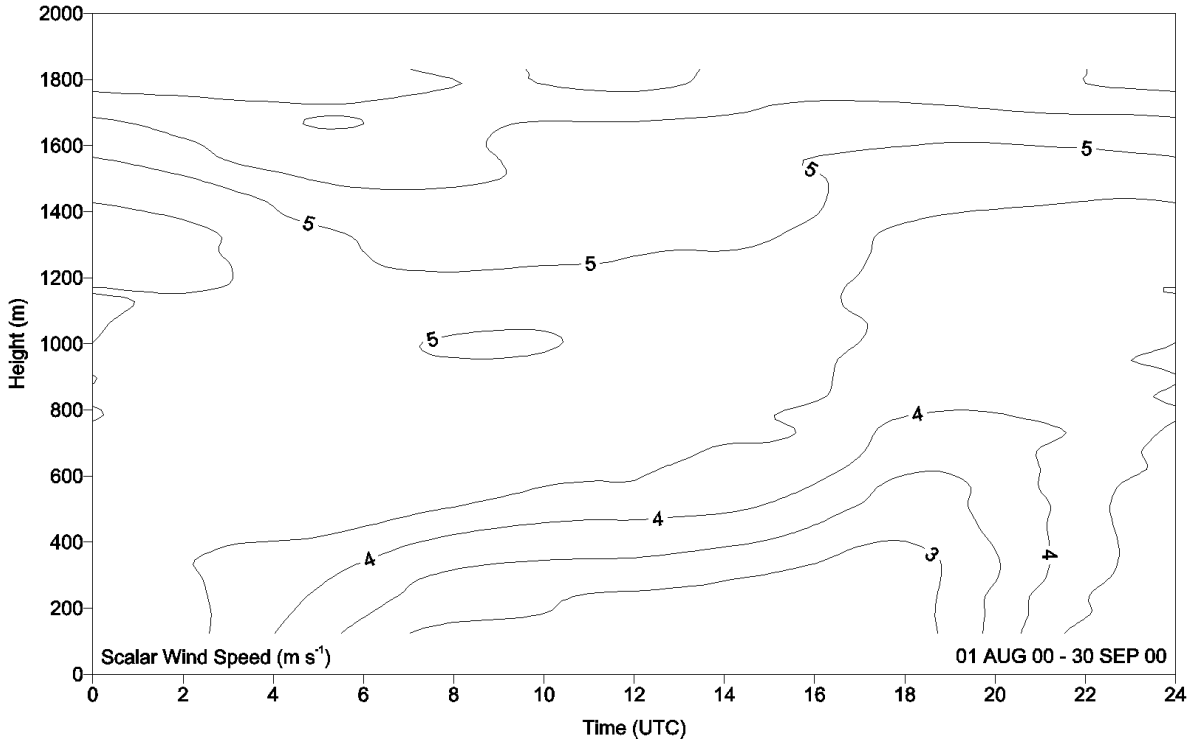

Figure 63. Radar (mode 1) scalar wind speed as a function of time and height.

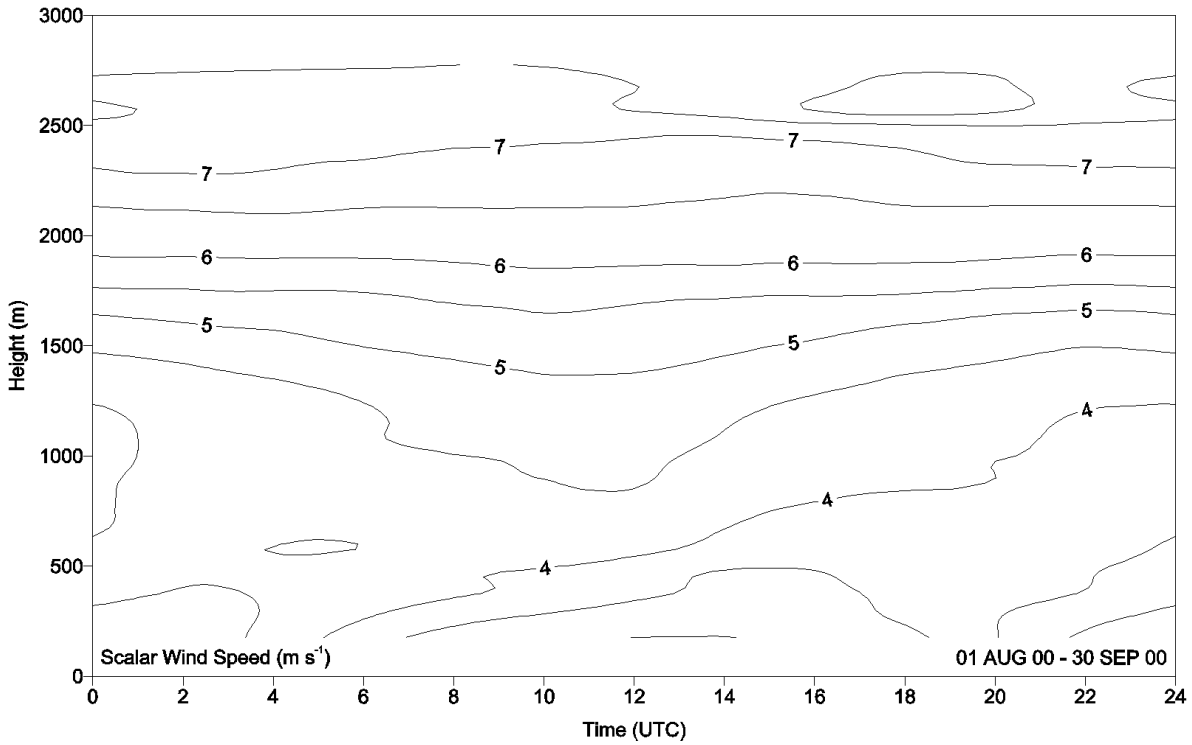

Figure 64. Radar (mode 2) scalar wind speed as a function of time and height.

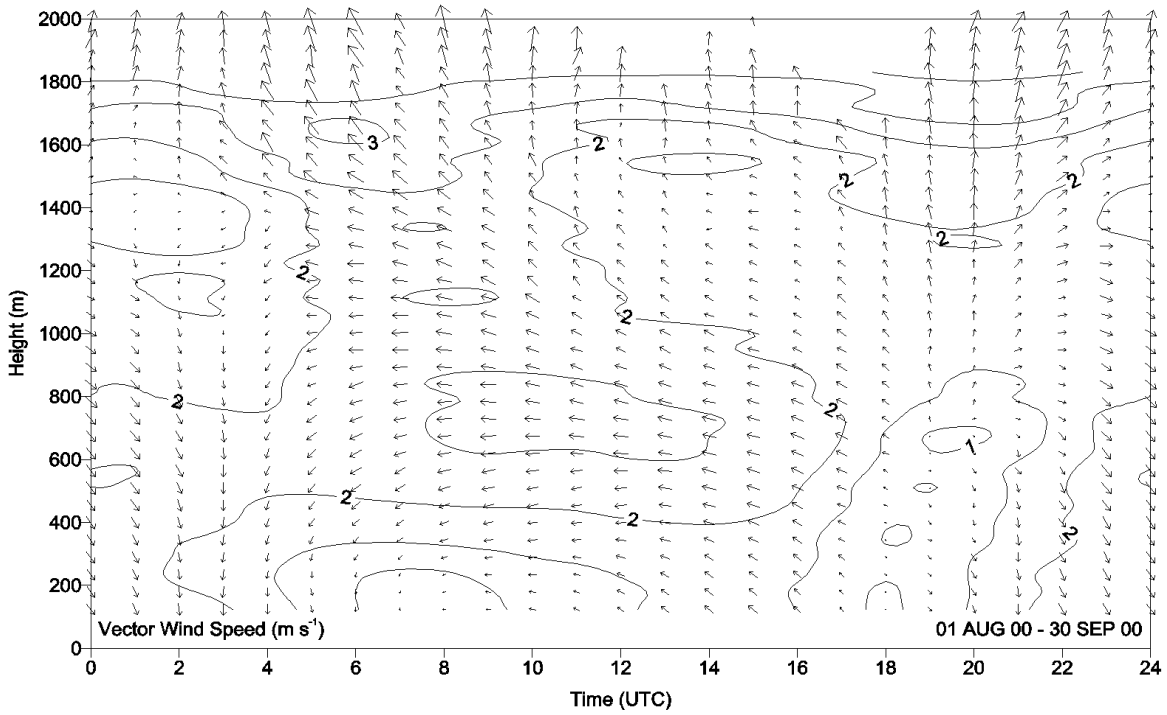

Figure 65. Radar (mode 1) vector wind speed as a function of time and height.

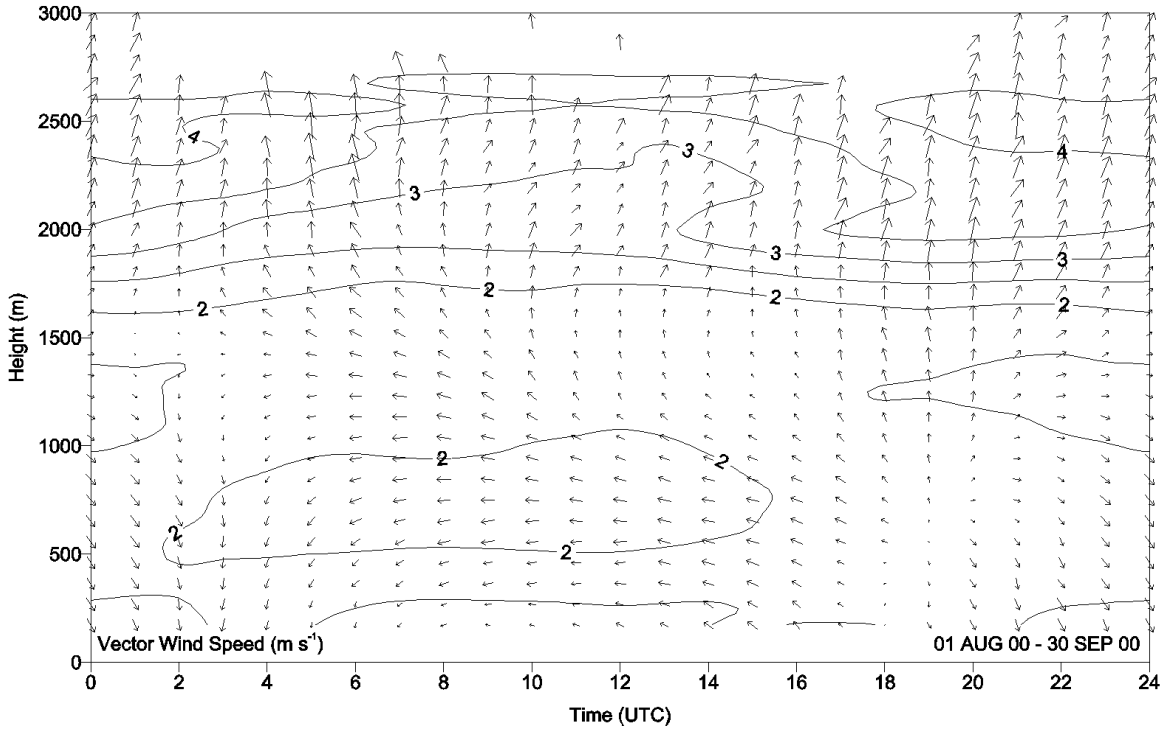

Figure 66. Radar (mode 2) vector wind speed as a function of time and height.

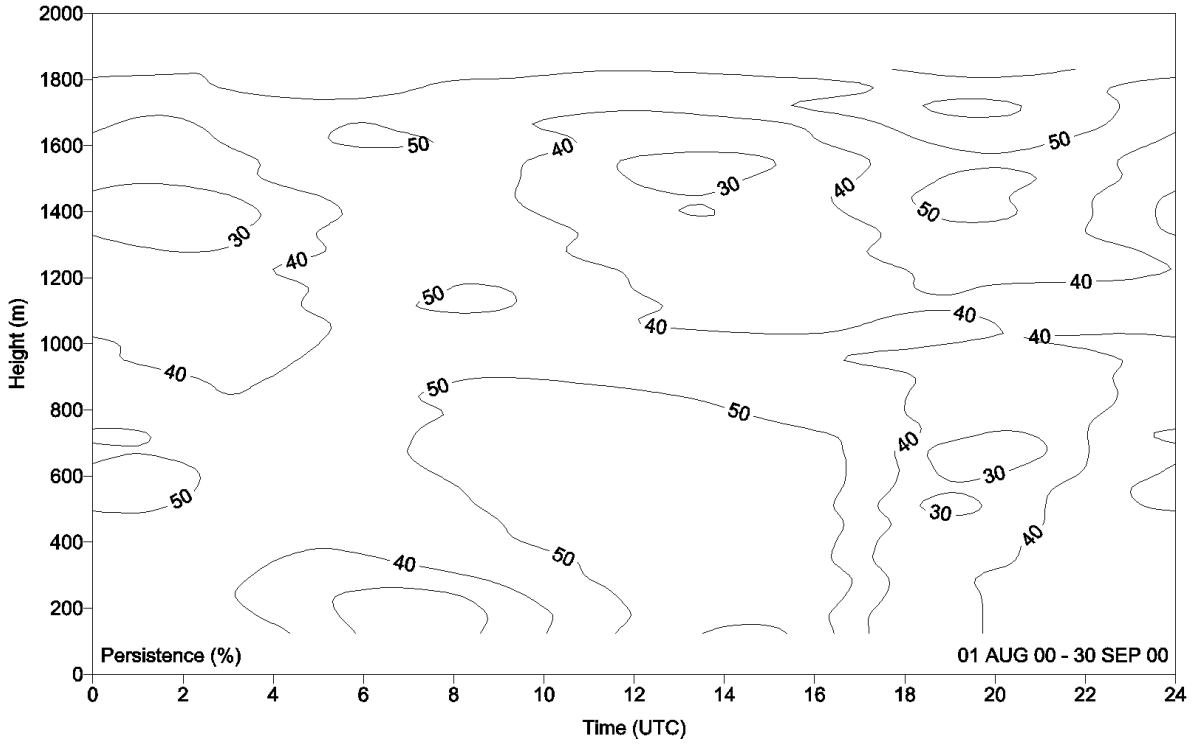

Figure 67. Radar (mode 1) persistence as a function of time and height.

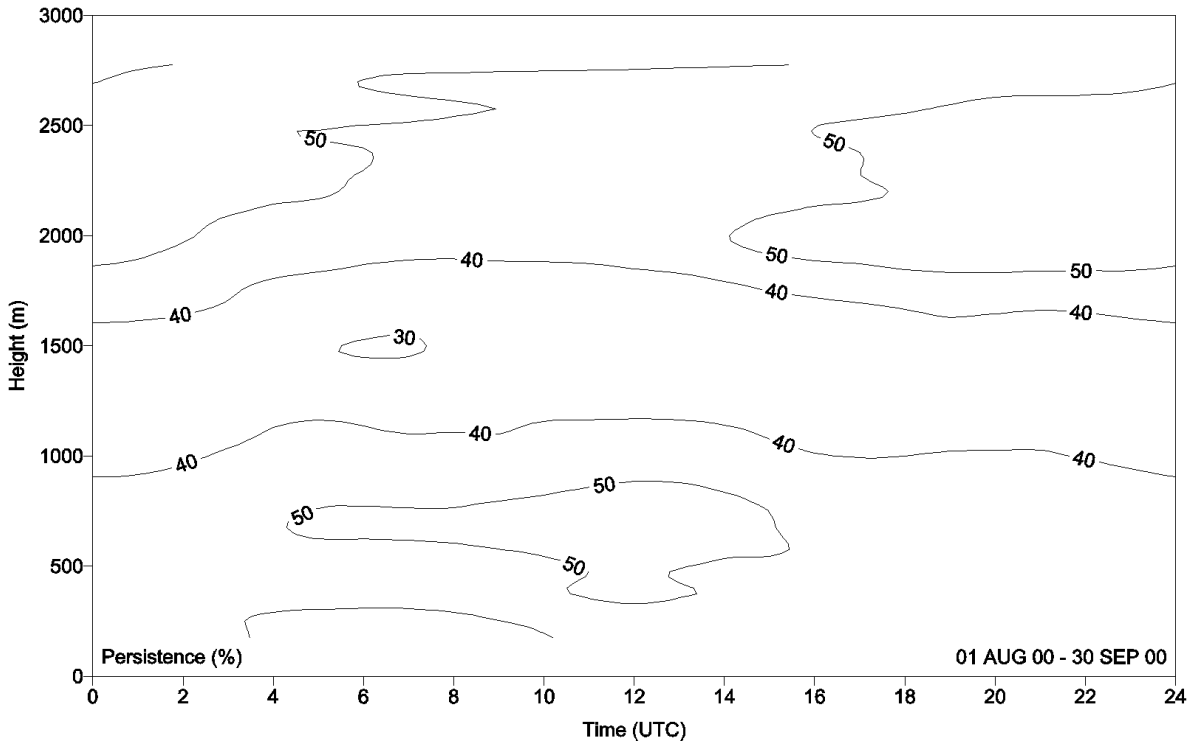

Figure 68. Radar (mode 2) persistence as a function of time and height.